

Biomass energy: exploring potentials and competing resource claims

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Outline

- Issues: technology and economics
- Biomass supply
- Bio-energy demand
- What next?

Issues: technical feasibility and economic choices

- Utilisation of biomass potential depends on
 1. Agronomic features, including land availability and growing conditions
 2. (supply) response of farmers, i.e. the decision to grow bio-energy relevant crops
 3. Technical substitutability of biomass energy for conventional energy sources
 4. Economic substitutability of biomass energy for conventional energy sources
 5. National and global policies
 6. Social considerations
 7. Environmental considerations
 8.

Models?

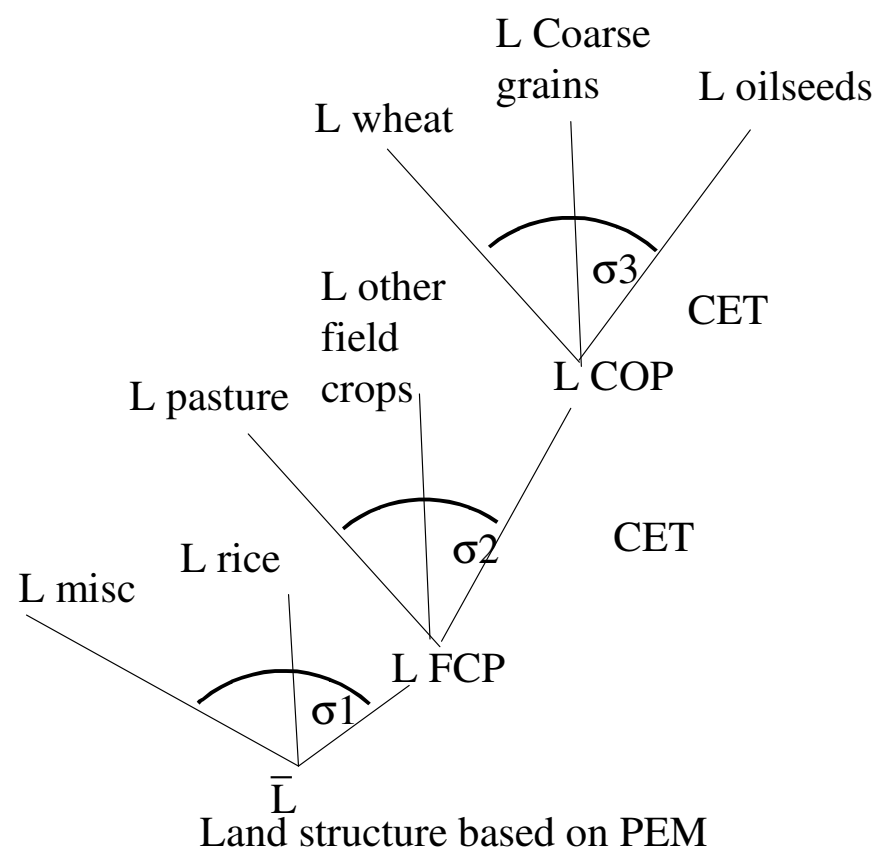
- Projections based only on technical feasibility usually off-mark
 - Over-optimistic or over-pessimistic
- Model based only on economics are weak on technology and agronomics

Modelling needs

- Biomass supply side:
 - Integrate agronomics and economic choices
 - Land allocation
 - Competing claims: bio-energy and food (security)
- Biomass demand side:
 - Modelling of energy demand
 - Substitution between alternative energy sources

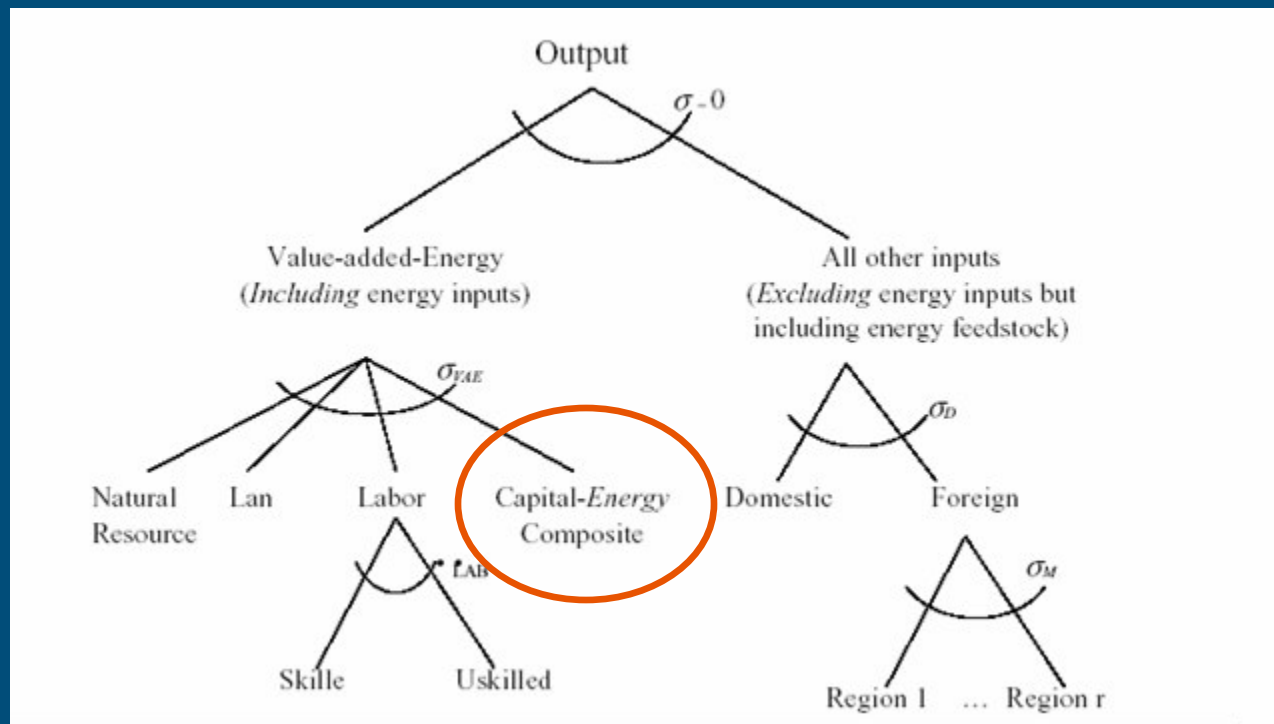
Supply side: land allocation in GTAPEM

- Land is imperfectly mobile across crops
- Relative returns drive decisions
- Policies may intervene
- Proven in OECD-LEI work



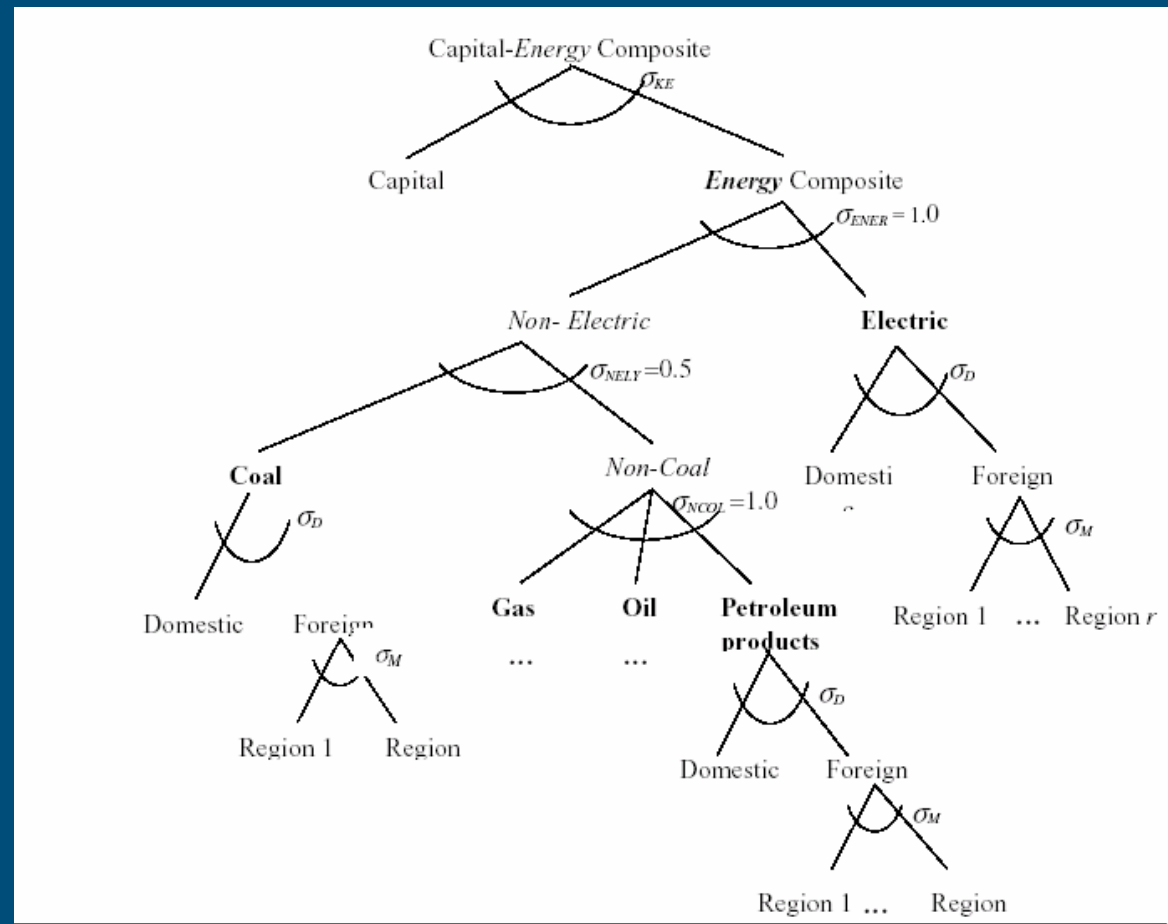
Demand side: energy demand in GTAP-E

Production structure:



Capital-energy composite:

- substitution in demand between alternative energy sources
- also domestic-foreign subs.
- proven in IPCC applications



GTAP: Global Trade Analysis Project

- GTAP lowers entry level for global trade policy analysis:
 - global database of production and bilateral trade
 - applied multi-region multi-sector GE model
 - training, technical support and documentation
 - network of researchers
- **Core funding from international consortium, 18 international and national agencies, e.g:**
 - WTO, World Bank, UNCTAD, USDA/ERS, OECD, USEPA, MIT...LEI (member since Nov. 96)
 - headquarters Purdue Univ., Tom Hertel
- See www.gtap.org
For network, conferences, course, papers

GTAP v6 commodities

Primary agriculture

Paddy rice
Wheat
Cereal grains nec
Vegetables, fruit, nuts
Oil seeds
Sugar cane, sugar beet
Plant-based fibers
Crops nec
Cattle,sheep,goats,horses
Animal products nec
Raw milk
Wool, silk-worm cocoons

Natural resource based activities

Forestry
Fishing
Coal
Oil
Gas
Minerals nec

Processing agriculture and food

Meat: cattle,sheep,goats,horse
Meat products nec
Vegetable oils and fats
Dairy products
Processed rice
Sugar
Food products nec
Beverages and tobacco products

Manufacturing

Textiles
Wearing apparel
Leather products
Wood products
Paper products, publishing
Petroleum, coal products
Chemical,rubber,plastic prods
Mineral products nec
Ferrous metals
Metals nec
Metal products
Motor vehicles and parts
Transport equipment nec
Electronic equipment
Machinery and equipment nec
Manufactures nec
Electricity
Gas manufacture, distribution
Water
Construction
Trade
Transport nec
Sea transport
Air transport
Communication
Financial services nec
Insurance
Business services nec
Recreation and other services
PubAdmin/Defence/Health/Educat
Dwellings

Services

Additional data on energy use:

- Coal, oil, gas, petroleum products, electricity
- Volumes (Mtoe) and prices
- Harmonized and consistent
- Biomass small share -> not (yet) separate

GTAP v6 regions

- 87 regions (built from 226 members)
- Economy-wide coverage
- Input-Output tables
- Bilateral trade flows
- Policy data

Where to go from here?

- Global scenarios with GTAP ++ as consistency framework
 - Multidisciplinary interactive scenario design
 - Identify economic and technical driving forces
- Work needed:
 - Biomass issues folded into energy demand and crop supply